CLAIMS

1. (currently amended) A process for depositing a coating comprising tungsten oxide on the surface of a glass substrate to produce a solar control glass which transmits a high percentage of incident light, ~~by~~ comprising directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen on to the surface of the glass substrate, wherein the glass substrate is in the form of a hot glass ribbon, which is at a temperature in the range 500°C to 720°C during a float glass production process.

2. (original) A process according to claim 1 wherein the coating comprising tungsten oxide comprises a layer of tungsten oxide.

3. (previously presented)A process according to claim 1 wherein tungsten oxyhalide comprises a tungsten oxychloride.

4. (previously presented)A process according to claim 1 wherein tungsten oxyhalide or tungsten chloride comprises a substituted tungsten oxyhalide or tungsten chloride.

5. (previously presented)A process according to claim 1 wherein the source of oxygen comprises an ester.

6. (original) A process according to claim 5 wherein the ester has from 3 to 6 carbon atoms.

7. (previously presented)A process according to claim 5 wherein the ester is ethyl acetate or butyl acetate.

8. (previously presented)A process according to claim 1 wherein the gaseous stream contains oxygen gas.

9. (previously presented)A process according to claim 1 wherein the ratio of tungsten oxyhalide or tungsten chloride and the source of oxygen are such that the layer of tungsten oxide is deposited as non-stoichiometric tungsten oxide.

10. (previously presented)A process according to claim 1 wherein the gaseous stream contains a source of fluorine.

11. (original) A process according to claim 10 wherein the source of fluorine comprises hexafluoroethane, trifluoroacetic acid or hexafluoropropylene oxide.

12. (previously presented)A process according to claim 1 wherein tungsten oxyhalide or tungsten chloride is entrained in the gaseous stream by flowing inert gas over hot tungsten oxyhalide or tungsten chloride.

13. (original) A process according to claim 12 wherein tungsten oxyhalide or tungsten chloride is at a temperature in the range 170°C to 210°C.

14. (previously presented)A process according to claim 12 wherein the inert gas comprises nitrogen.

15. (previously presented)A process according to claim 1 wherein the source of oxygen comprises an ester and is entrained in the gaseous stream by contacting said ester with a flowing inert gas.

16. (original) A process according to claim 15 wherein the ester is at a temperature in the range 30°C to 45°C.

17. (previously presented)A process according to claim 1 wherein the tungsten oxide layer has a thickness in the range 70 to 180 nm.

18. (previously presented)A process according to claim 1 wherein the tungsten oxide layer is deposited at a growth rate in the range 3 to 25 nm s^{-1}.

19. (previously presented)A process according to claim 1 wherein the tungsten oxide layer is overcoated with a further layer.

20. (currently amended) A process for coating glass in a float glass production process comprising directing a gaseous stream containing a tungsten compound and a source of oxygen on to the surface of a glass substrate thereby forming a non-stoichiometric tungsten oxide layer wherein the tungsten oxide layer is overcoated with a further layer.

21. (previously presented)A process according to claim 20 wherein the further layer comprises a metal oxide.

22. (previously presented)A process according to claim 20 wherein the further layer comprises fluorine doped tin oxide.

23-33 (canceled)

34. (previously presented)A process according to claim 1 wherein the glass substrate is at a temperature in the range 565°C to 655°C.

35. (previously presented)A process according to claim 1 wherein the tungsten oxide layer is deposited on to coated glass.

36. (previously presented)A process according to claim 35 wherein the coated glass has a coating comprising silicon oxide.

37. (previously presented)A process according to claim 36 wherein the coating comprising silicon oxide further contains carbon.

38. (currently amended) A process for coating glass in a float glass production process comprising entraining a tungsten compound in a gas by flowing the gas over a tungsten compound at a temperature below its melting point and directing the gaseous stream on to the surface of a glass substrate thereby forming a tungsten oxide layer, wherein the glass substrate is at a temperature in the range of 500°C to 720°C.

39. (previously presented)A process according to claim 38 wherein the tungsten compound is tungsten halide, tungsten oxyhalide or tungsten carbonyl.

40. (currently amended) A method of coating glass in a float glass production process comprising

(a) providing a glass substrate having a temperature in the range of 500°C to 720°C,

(b) preparing a gaseous stream comprising a source of oxygen and a tungsten compound selected from the group consisting essentially of tungsten oxyhalide and tungsten chloride, and

(c) directing the gaseous stream on to the glass substrate, thereby depositing a coating comprising tungsten oxide on the glass substrate.

41. (currently amended) A process for depositing a coating comprising tungsten oxide on the surface of a glass substrate in a float glass production process, by directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and an ester on to the surface of the glass substrate.

42. (previously presented)A coated glass produced by a process according to claim 1.

43. (previously presented)A multiple glazing unit comprising a coated glass according to claim 42 in spaced opposed relation to a glazing pane.

44. (previously presented)A process according to claim 1 wherein the tungsten oxyhalide comprises tungsten oxytetrachloride.

REMARKS

This response is being presented in response to the Examiner's action of February 11, 2003. The Examiner has indicated that all of the claims, that is claims 1-23 and 34-44, have been rejected. In light of the amendments and following detailed arguments, it is respectfully submitted that the claims fully distinguish over the applied prior art and are in condition for allowance.

Claims 1-19, 23, 34-37, 42 and 43 were rejected by the Examiner under 35 USC §112, second paragraph, as being indefinite for failing to point out and particularly claim the subject matter of the invention. The Examiner indicates that applicant added the limitation of "to produce a glass which transmits a high percentage of incident light". The Examiner indicates that this in confusing due to the lack of comma usage, and the lack of insight into what is considered a high percentage.

In response thereto, applicant has amended claim 1 to include an additional comma, and the term "comprising". Additionally, claim 1 has been amended to indicate that the glass is solar control glass, which is a well known term in the art. It is believed that the use of this well known term (see, e.g., PPG Sungate and Guardian Sun Guard glasses, as defined on their companies web sites) defines the "high percentage of incident light" as used in the claim. It is therefore believed that all the claims are in compliance with 35 USC §112, second paragraph.

The Examiner rejected claims 1, 5-8, 34-35 and 40-42 under 35 USC §102(e) as being anticipated by Saegusa et al. (US 6,126,743). The Examiner also rejected claims 4 and 18 under 35 USC §103 as being unpatentable over Saegusa et al. Claims 1-3, 8, 10-14, 18, 23, 34, 38-40, 42 and 44 were also rejected under 35 USC §103 as being unpatentable over Proscia (US 5,286,520) in view of Tracy et al (US 4,687,560). Claims 1-3, 8, 34, 35, 40-42 and 44 were rejected under 35 USC §103 as being unpatentable over Dai et al. (XP-002123373). Claims 1, 2, 5-9, 17-22, 34-37 and 40-44 were rejected under 35 USC §103 as being unpatentable over Gallego et al (US 6,048,621) in view of Tracy et al. Claims 1, 2, 5-8, 10-16, 18, 23, 34-35, 39-

42 and 44 were rejected under 35 USC §103 as being unpatentable over Riaz et al (US 5,385,751) in view of Tracy et al.

The present invention provides a process for the production of a tungsten oxide coating which uses particular tungsten precursors and which is carried out in a temperature range (500°-720° than was previously contemplated. This allows coatings to be deposited within a range of stoichiometries. The higher temperatures of the range offer advantages in the on-line production of coated glass, as there is an improved opportunity to deposit an additional coating or coatings on-line.

Independent claim 1 was rejected: under 35 USC §102(e) as being anticipated by Saegusa et al; under 35 USC §103 as being unpatentable over Proscia in view of Tracy; under 35 USC §103 as being unpatentable over Dai et al; under 35 USC §103 as being unpatentable over Gallego in view of Tracy; and under 35 USC §103 as being unpatentable over Riaz in view of Tracy.

Independent claim 1 is directed to a process for depositing a coating comprising tungsten oxide on the surface of a glass substrate to produce a solar control glass which transmits a high percentage of incident light. The process directs a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen on to the surface of the glass substrate. The glass substrate is at a temperature in the range 500°C to 720°C.

Independent claim 20 was rejected under 35 USC §103 as being unpatentable over Gallego in view of Tracy. Claim 20 is directed to a process for coating glass. The process comprises directing a gaseous stream containing a tungsten compound and a source of oxygen on to the surface of a glass substrate thereby forming a non-stoichiometric tungsten oxide layer. The tungsten oxide layer is overcoated with a further layer.

Independent claim 38 was rejected under 35 USC §103 as being unpatentable over Proscia in view of Tracy. Independent claim 38 defines a process for coating glass. The process includes entraining a tungsten compound in a gas by flowing the gas over a tungsten compound at a temperature below its melting point. The gaseous stream is directed onto the surface of a

glass substrate thereby forming a tungsten oxide layer. The glass substrate is at a temperature in the range of 500°C to 720°C.

Independent claim 40 was rejected: under 35 USC §102(e) as being anticipated by Saegusa; under 35 USC §103 as being unpatentable over Proscia in view of Tracy; under 35 USC §103 as being unpatentable over Dai et al; under 35 USC §103 as being unpatentable over Gallego in view of Tracy; and under 35 USC §103 as being unpatentable over Riaz in view of Tracy.

Independent claim 40 defines a method of coating glass which comprises providing a glass substrate having a temperature in the range of 500°C to 720°C. Then, preparing a gaseous stream comprising a source of oxygen and a tungsten compound selected from the group consisting essentially of tungsten oxyhalide and tungsten chloride. And finally, directing the gaseous stream on to the glass substrate, thereby depositing a coating comprising tungsten oxide on the glass substrate

Independent claim 41 was rejected: under 35 USC §103 as being unpatentable over Dai; under 35 USC §103 as being unpatentable over Gallego in view of Tracy; and under 35 USC §103 as being unpatentable over Riaz in view of Tracy.

Claim 41 defines a process for depositing a coating comprising tungsten oxide on the surface of a glass substrate. A gaseous stream comprising tungsten oxyhalide or tungsten chloride and an ester are directed on to the surface of the glass substrate.

Rejection of claims 1, 5-8, 34-35 and 40-42 under 35 USC §102(e) as being anticipated by Saegusa et al

Claim 1 has been amended herein to specify that the glass being produced is a solar control glass. Saegusa does not teach or suggest that the glass being produced is a solar control glass. Further, the disclosure of Saegusa is confined to a production of a mixed oxide having the formula $wXMO_3$—(l-w)(XOy-aGo_z) as defined in column 3, the first paragraph. Tungsten is one of 13 listed possibilities for reference letter "M". This is what Saegusa teaches in column 5 and

it is respectfully submitted that this teaching does not anticipate the present invention as claimed in claim 1. The claimed process requires a gaseous stream comprising a tungsten oxyhalide or a tungsten chloride and a source of oxygen be brought into contact with a hot glass substrate. In column 5, line 18, Saegusa mentions the use of tungsten halide as one of many possibilities previously useful in such a CVD process. Saegusa, however, *does not disclose the use of a source of oxygen* in such a process. The reference to ethyl acetate in column 7, line 50 of Saegusa *does not disclose ethyl acetate as an oxygen source*, as is claimed in the present claim 1. Instead, Saegusa lists ethyl acetate as one of a number of solvents which may be applied to a substrate by dip coating, spray coating, spinner coating or brushing. There is nothing in the disclosure of Saegusa to teach, or even to suggest, the use of ethyl acetate as an oxygen source as is used in the present claim.

In addition, the Examiner opines that the products disclosed by Saegusa would transmit a high proportion of visible light. Saegusa is silent as to the transmission of visible light through the defined coated substrates. Nowhere, in the disclosure of Saegusa, is the light transmission of any coated glass product contemplated. As defined above, the teaching of Saegusa differs from that of the current claim 1, and as such there is no basis to assert that the transmission of the article defined in Saegusa will inherently be the same as those of the present invention. Lacking this disclosure, it is respectfully submitted that it is improper that Saegusa be used to anticipate the current claims.

With regard to the rejections of claims 4 and 18 under 35 USC §103, applicants submit that Saegusa is not relevant to claims 4 and 18, which are directed to the production of solar control glass. Further, it is respectfully submitted that claim 1, from which these claims depend, is allowable. Therefore is respectfully submitted that claim 1, and any claims dependent therefrom, are not anticipated by, nor rendered unpatentable by, Saegusa.

Rejections under 35 USC §103.

With respect to the rejections under 35 USC §103, please note that independent claims 1, 20, 38, 40 and 41 have each been amended herein to indicate that the process for forming the glass coatings is a float glass production process. The amendment to indicate the float glass production process finds support, at least, in the first paragraph of page 6 of the patent application as filed. Therefore, no new matter was submitted by the inclusion of this subject matter into the claims.

It is respectfully submitted that it is weil known to those skilled in the art that the float glass production process is carried out at essentially atmospheric pressure. The Tracy reference, at column 4, line 67, indicates that the processes described therein are carried out at a pressure of 0.013 torr. Tracy's disclosure is thus not relevant to a process carried out in an atmospheric pressure CVD float glass process.

Tracy is listed by the Examiner as the secondary reference on three of the obviousness rejections under 35 USC §103. Based on the above, it is respectfully submitted that the rejections of claims 1-3, 8, 10-14, 18, 23, 34, 38-40, 42 and 44 under 35 USC §103 as being unpatentable over Proscia in view of Tracy; claims 1, 2, 5-9, 17-22, 34-37 and 40-44 under 35 USC §103 as being unpatentable over Gallego in view of Tracy; and the rejection of claims 1, 2, 5-8, 10-16, 18, 23, 34-35, 39-42 and 44 under 35 USC §103 as being unpatentable over Riaz in view of Tracy are all improper and should be withdrawn.

It is additionally submitted that the references to Proscia, Gallego and Riaz, which are the primary references for each of the above rejections, fail to teach the use of tungsten halide, or tungsten chloride, as do the independent claims rejected by these references. These claims are thus distinguished from the Proscia, Gallego and Riaz references by the use of these compounds, and further distinguished from these references by the use of higher temperatures than are discussed in the art.

With regard to these §103 rejections, it is respectfully submitted that the defects in the primary references related to temperatures and the lack of use of tungsten halides, and the defects in the secondary reference related to their use at much lower pressures than that required by the float glass process of the independent claims, indicate that no reasonable combination of the applied references can yield the inventions disclosed in independent claims 1, 20, 38, 40 and 41. It is therefore believed that these claims fully distinguish over these references.

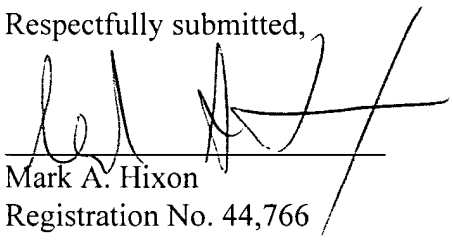
With regard to the rejections under the Dai reference, it is respectfully submitted that the Dai reference discloses that the processes are typically carried out at a pressure of 250-500Pa, which is again a reduced pressure compared to the pressure expected for a CVD float glass process. Therefore, it is submitted that the processes disclosed by the Dai reference are unsuitable for use in a float glass CVD process, and the Dai reference is not applicable to the claims of the present invention. Therefore, it is respectfully submitted that Dai is improperly applied against the present invention. Based on the forgoing, the rejection of claims 1-3, 8, 34, 35, 40-42 and 44 under 35 USC §103 as being unpatentable over Dai is also submitted to be improper. Reconsideration and withdrawal of this rejection are also respectfully requested.

Applicant's invention lies in the discovery that these processes are useful in depositing a tungsten oxide coating as part of a float glass production process. The process provides a significant advantage over the prior art in that they enable a tungsten coating to be deposited at an earlier stage in the float glass process, thereby enabling further layers to be deposited on top of the tungsten oxide layer during the same production process.

Therefore, on the basis of the forgoing arguments, it is respectfully submitted that independent claims 1, 20, 38, 40 and 41 fully distinguish over the applied references. Any dependent claims not specifically discussed hereinabove are believed to be allowable based, at least, upon their dependence on allowable base claims as discussed above.

In view of the above remarks, a favorable reconsideration of the present application and the passing of this application to issue with all claims allowed are courteously solicited. If the Examiner wishes to modify any of the language of the claims in an effort to move the application towards allowance, a telephone call to the undersigned would be greatly appreciated.

Respectfully submitted,



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